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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/544,291	08/04/2005	Herbert Bruder	32860-000908/US	9190

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HARNESS, DICKEY & PIERCE, P.L.C.
P.O.BOX 8910
RESTON, VA 20195

EXAMINER	
TANINGCO, ALEXANDER H	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 05/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/544,291	BRUDER ET AL.	
	Examiner	Art Unit	
	Alexander H. Taningco	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08/04/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 August 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/04/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1-4, 8, 10-13, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,377,250) in view of Silver et al. (US 2003/0123614).

Regarding claims 1 and 16, Hu discloses a method comprising: scanning an examination object **42** by moving a focus on a spiral focal track **22** about the examination object and a planar detector **44** for detecting the beam (Col. 12 Line 27; Col. 12 Lines 3-6), the detector supplying output data corresponding to the detected radiation and reconstructing image voxels **80** from the scanned examination object from the output data (Col. 10 Lines 15-33) and reproducing attenuation coefficients **28** of the respective voxel (Col. 10 Lines 15-22), each image voxel being reconstructed separately from projection data that include a projection angular range β of at least 180 degrees (Col. 10 Lines 34-37; Col. 11 Lines 30-32 and 46-48), and an approximate weighting **86** taking place for each voxel considered in order to normalize the projection data used relating to the voxel (Fig. 2(d); Col. 12 Line 31). Hu fails to teach using a conical beam emanating from the focus. Silver et al. teaches an image reconstruction method in fan or cone-beam X-ray [0003]. It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method

comprising: a conical beam emanating from the focus, to collect data simultaneously for a number of rays as taught by Silver [0076 Lines 1-4].

Regarding claim 2, Hu as modified above discloses a method in order to reconstruct an image voxel all the detector data along a straight line that runs through the cone beam projection of the image voxel and is aligned in the direction of the projection of the spiral tangent (Fig. 5).

Regarding claim 3, Hu modified above discloses a method wherein the image data of the detector image are subjected to a cosine weighting **88** for compensating oblique radiation (Col. 12 Equation 4).

Regarding claim 4, Hu modified above discloses a method wherein data not directly available are obtained from the available data by interpolation from neighboring detector data (Col. 11 Lines 1-2).

Regarding claim 8, Hu modified above discloses a method wherein a distance weighting is performed for the purpose of 3D back projection into the voxel considered (Col. 12 Equation 2).

Regarding claim 10, Hu modified above discloses a method at least one focus **26** being movable β relative to the examination object **42** on at least one focal track that runs around the examination object and a detector array **44** situated opposite; means for collecting detector data **84**, filtering **89** and 3D back projection **90** and means for processing the measured data **60** being fashioned in such a way to carry out (Fig.1; Fig. 4).

Regarding claim 11, Hu modified above discloses a method computer program **60** product including program elements that during operation in a CT unit, execute the method as claimed in 1 (Fig.1; Fig. 4).

Regarding claim 12, Hu discloses a method wherein the image data of the detector image are subjected to a cosine weighting **88** for compensating oblique radiation (Col. 12 Equation 4).

Regarding claim 13, Hu discloses a method wherein data not directly available are obtained from the available data by interpolation from neighboring detector data (Col. 11 Lines 1-2).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,377,250) and Silver (US 2003/0123614) in further view of Noo et al (IEEE Vol. 7, no. 6, June 1998).

Regarding claim 7, Hu as modified above discloses a method as recited in cliam 1 above, including use of a helical Feldkamp reconstruction algorithm as taught by Silver [0092 Lines 9-10]. Hu as modified above fails to teach a method wherein a ramp filter that is manipulated with the aid of a smoothing window is applied to the normalized data. Noo teaches a Feldkamp algorithm wherein the kernel of a ramp filter is included in the algorithm (Pg. 857 Equation 11).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,377,250) and Silver (US 2003/0123614) in further view of Gullberg et al (IEEE Vol.11, no. 1, June 1992).

Regarding claim 9, Hu discloses a method as recited in claim 1 above. Hu fails to teach a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting the measured data in accordance with the movement phases of an examined heart. Gullberg discloses a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting the measured data in accordance with the movement phases of an examined heart (Pg.91 Para. 5). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting the measured data in accordance with the movement phases of an examined heart, for better diagnosis of ischemic heart disease as taught by Gullberg (Pg. 91 Para. 1 and Pg. 99 Para. 5).

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,377,250) and Silver (US 2003/0123614) in further view of Lai (US 6,118,841).

Regarding claim 5, Hu discloses a method of the above claim. Hu fails to teach a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$). Lai teaches a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$) [Col. 7 Lines 9-10, 21-22]. Lai teaches a standard symmetric array (Abs.) and the angular span of the beam (Col. 7

Lines 9-10). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$), for accurate reconstruction (Col. 7 Line 3).

Regarding claim 6, Hu as modified above discloses a method wherein the redundant data are multiplied by generalized Parker weights as taught by Silver [0017; Equation 1-5].

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu (US 5,377,250) and Silver (US 2003/0123614) in further view of Lai (US 6,118,841).

Regarding claim 14, Hu as modified above discloses a method of the above claim. Hu fails to teach a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$). Lai teaches a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$) [Col. 7 Lines 9-10, 21-22]. Lai teaches a standard symmetric array (Abs.) and the angular span of the beam (Col. 7 Lines 9-10). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are

regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$), for accurate reconstruction (Col. 7 Line 3).

Regarding claim 15, Hu as modified above in view of Lai, discloses a method wherein the redundant data are multiplied by generalized Parker weights (Equation 1-5).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patent and non-patent literature are cited to further show:

Besson et al. (US 6,459,754) (378/4)

- Helical trajectory with X-ray cone beam
- Voxel-driven backprojection
- FDK reconstruction algorithm

Galigekere et al.

Cone-Beam Reconstruction Using Projection-Matrices

IEEE Transaction on Medical Imaging

- Reprojection of 3-D reconstructions obtained from cone-beam scans
- Both voxel and ray-driven methods considered
- Weighting Function in Voxel-Driven Projection

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander H. Taningco whose telephone number is (571) 272-8048. The examiner can normally be reached on Mon-Fri 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER

Alexander Taningco
Patent Examiner
Art Unit 2882
571.272.8048

cT